No. 672,516.

Patented Apr. 23, 1901.

J. SCHINNELLER.

AXLE ROLLING MILL.

(Application filed June 8, 1900.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.

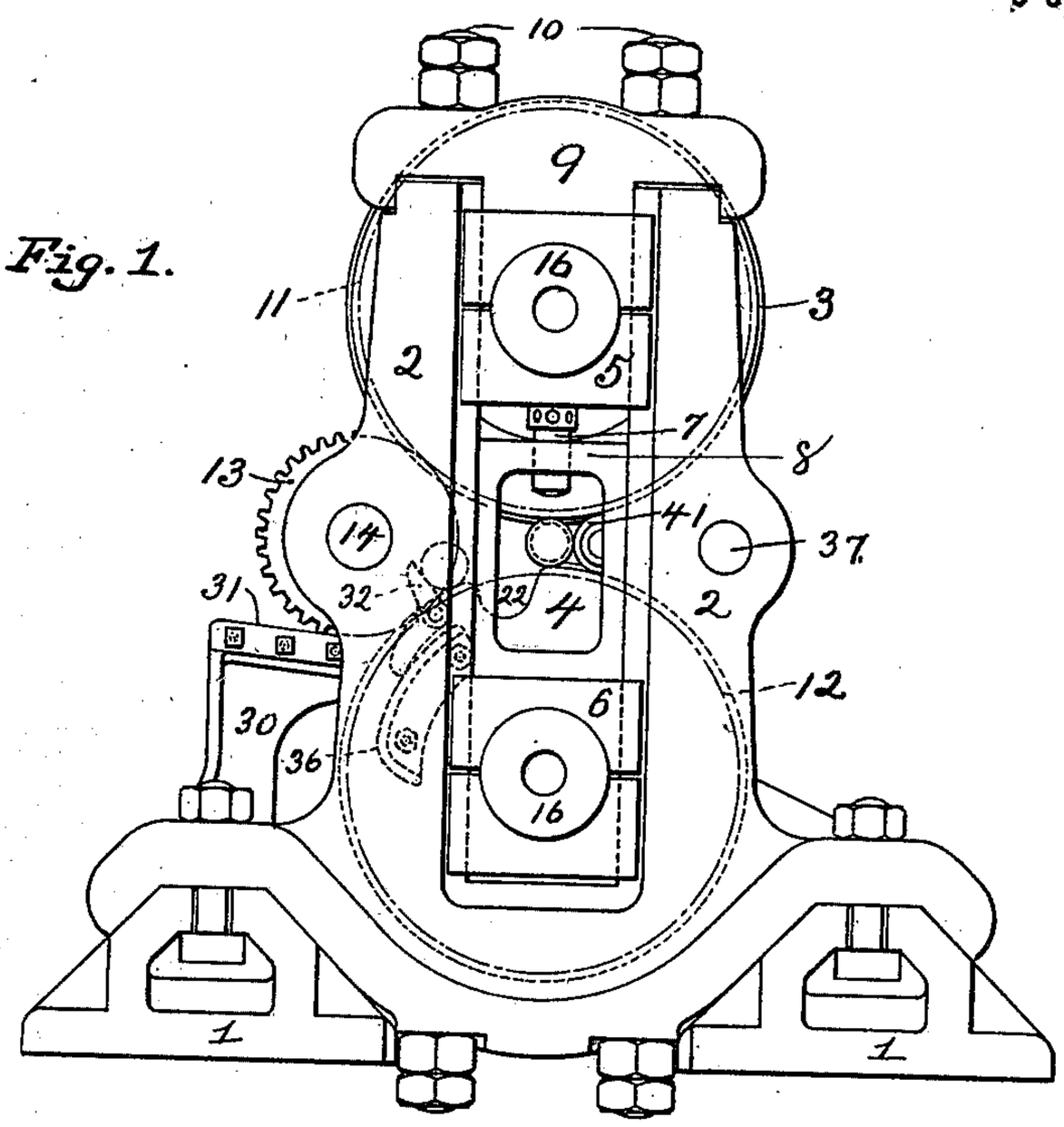
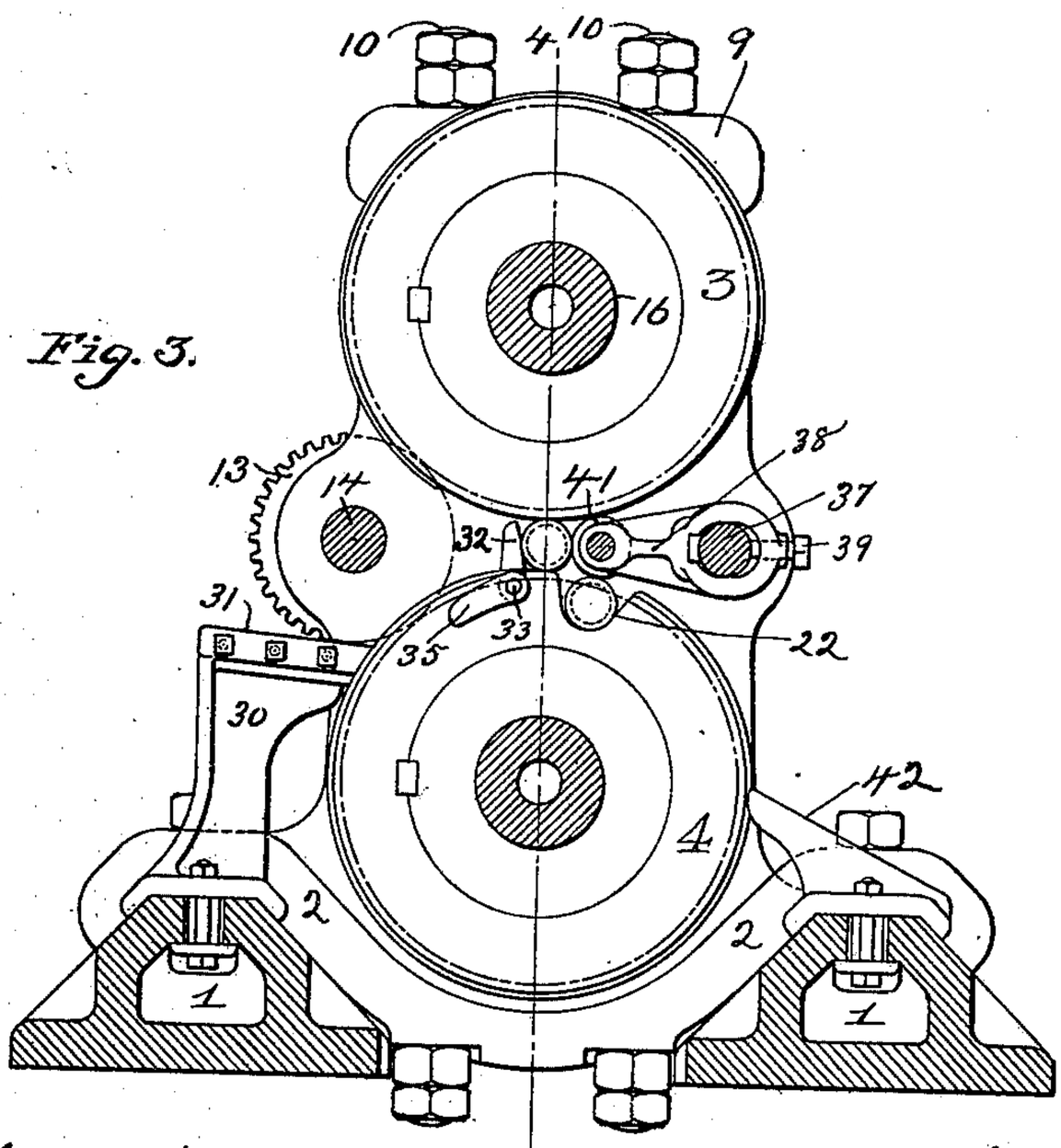


Fig. 3.



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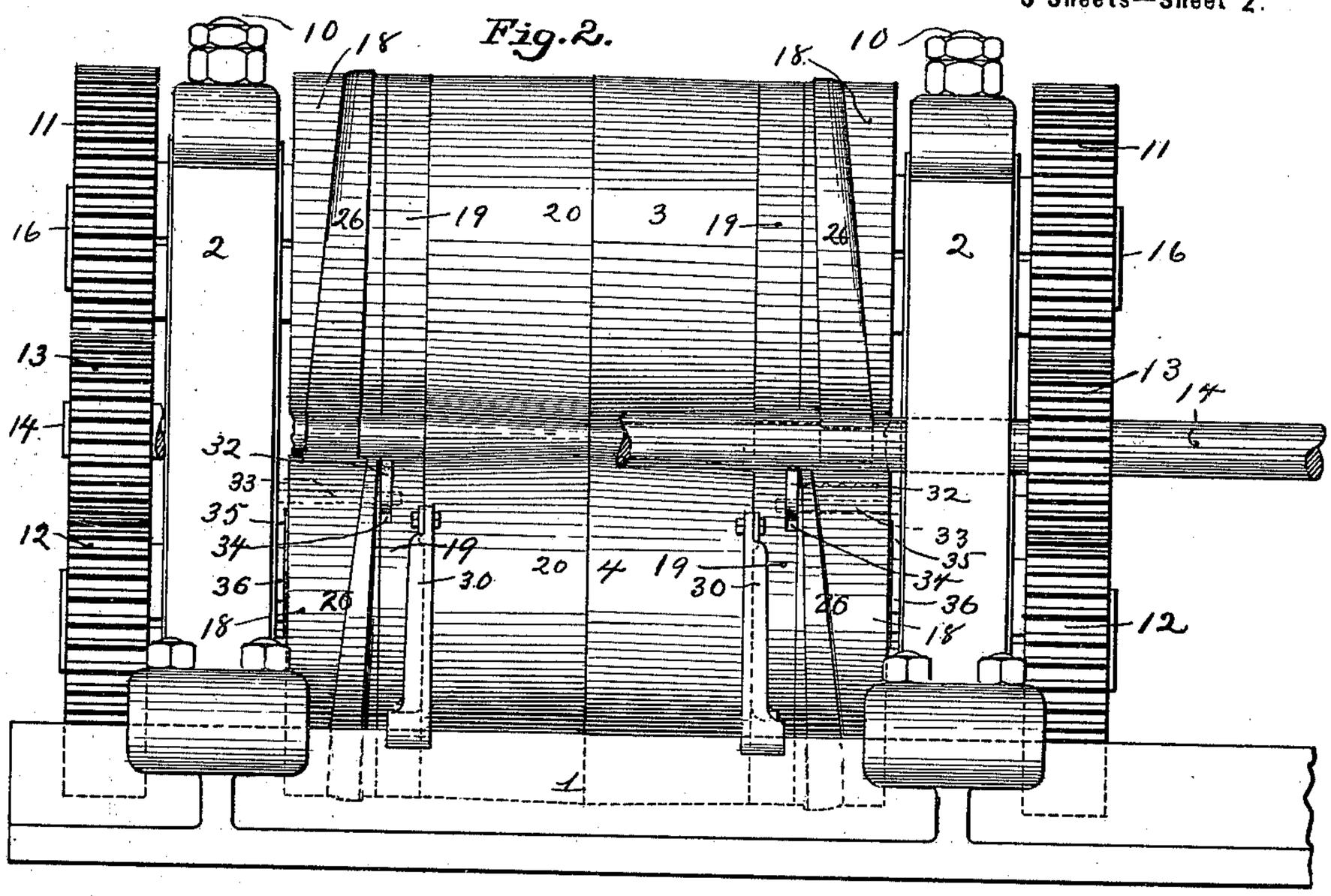
3 Sheets—Sheet 2.

Fig. 2.



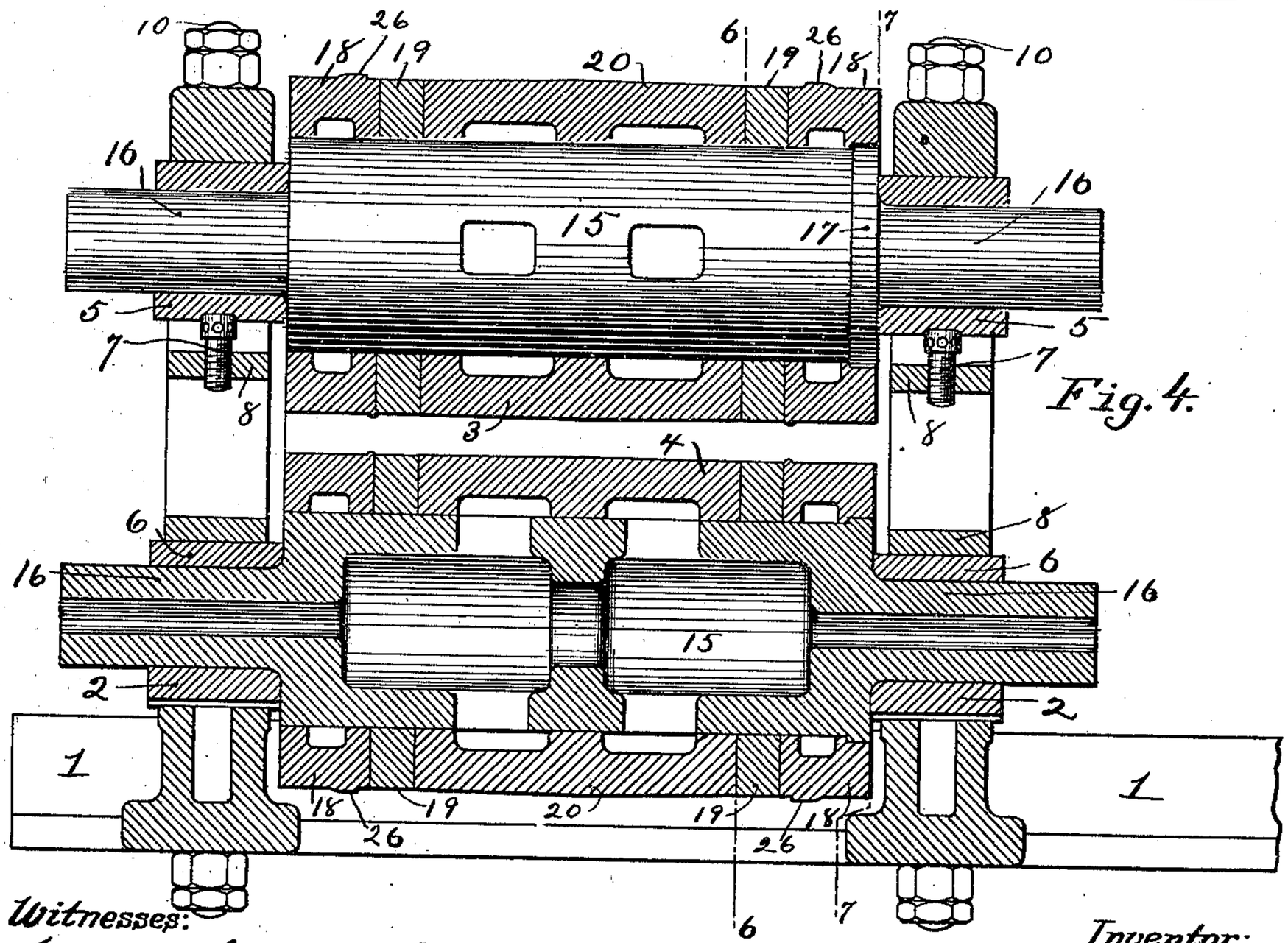


Fig. 4.

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(No Model.) 3 Sheets—Sheet 3.

Fig. 5.

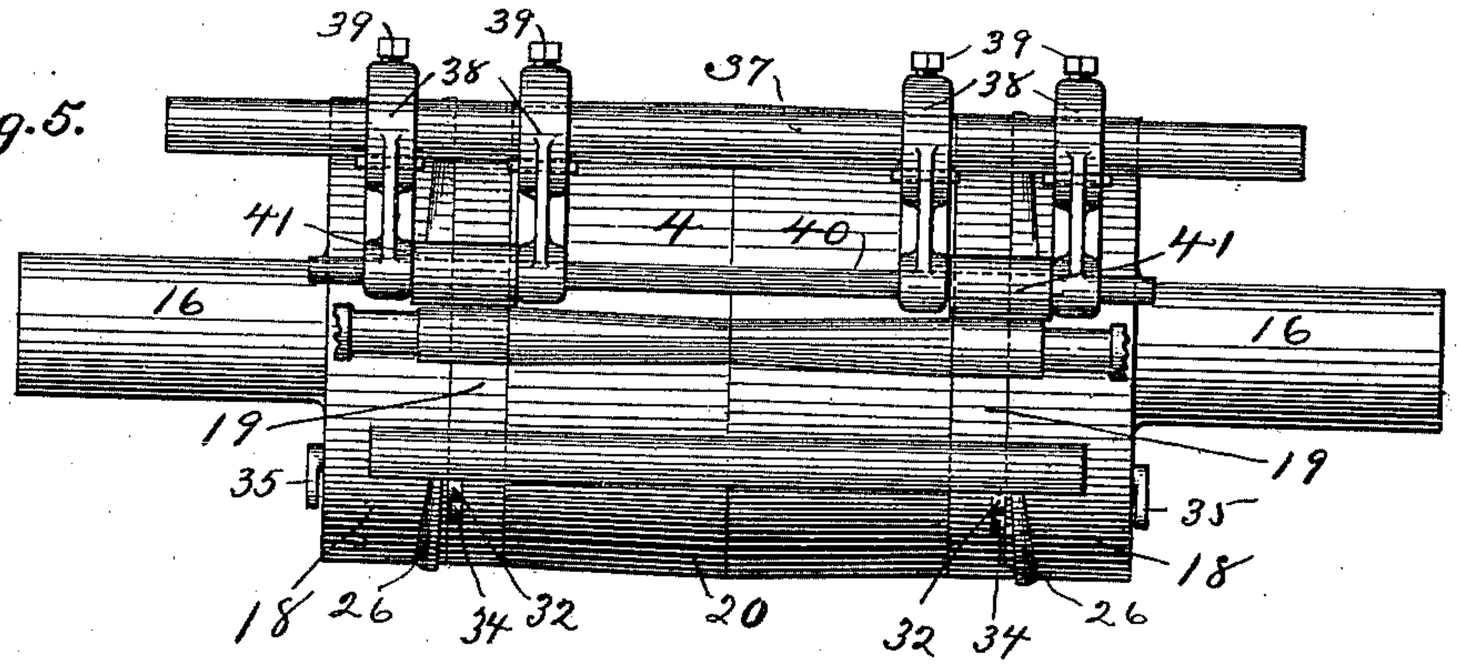


Fig. 6.

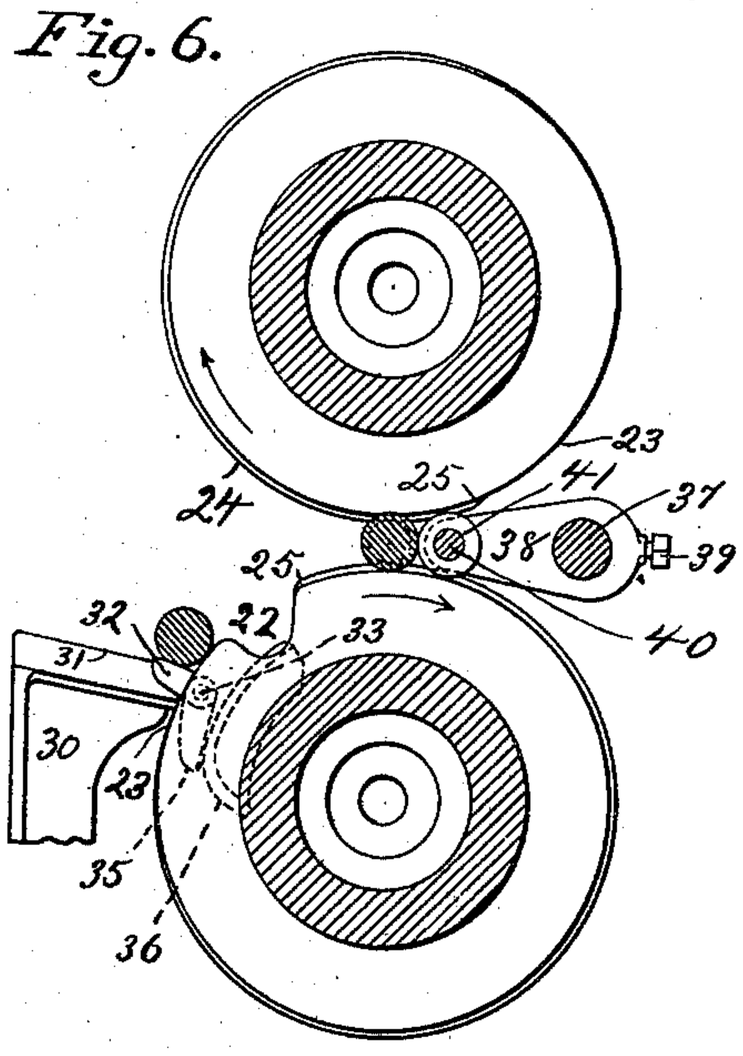


Fig. 7.

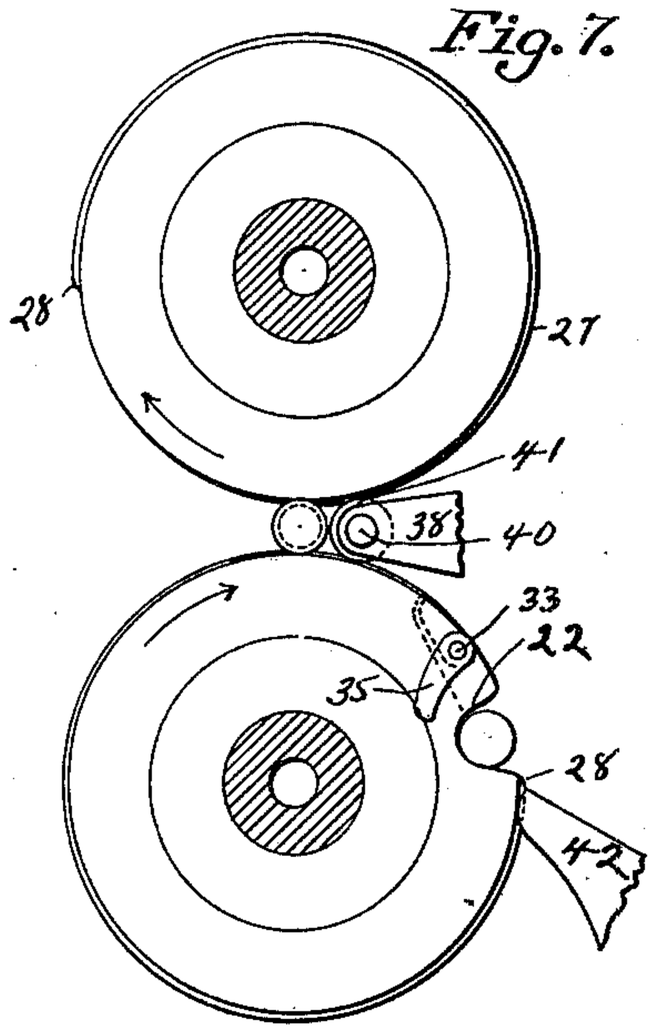
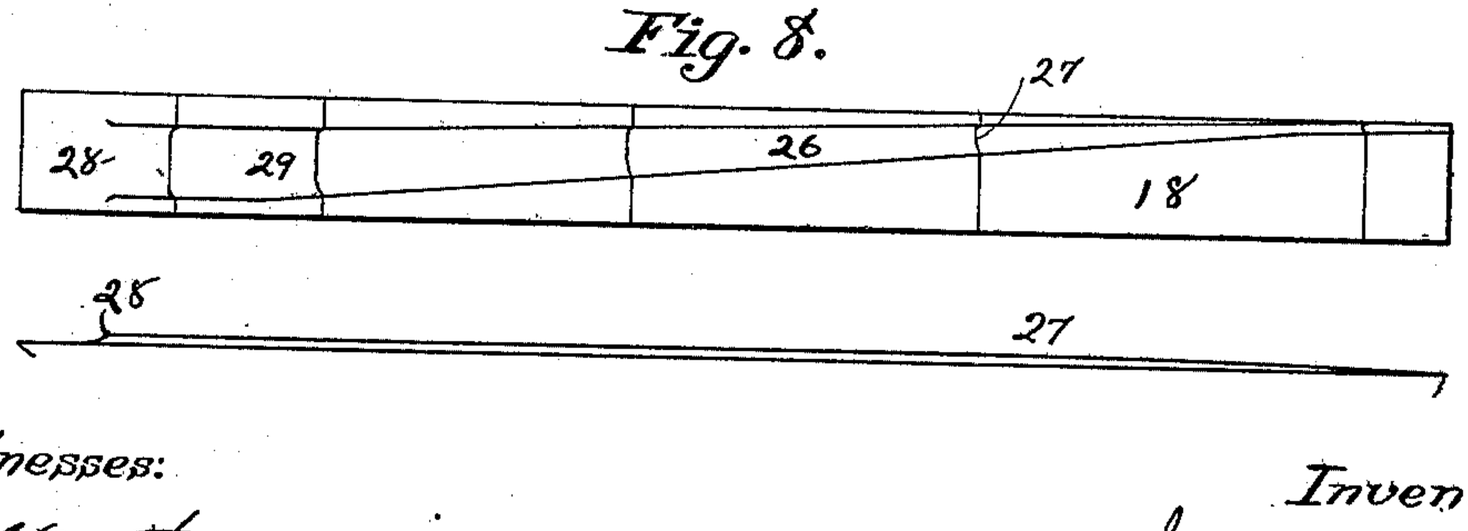


Fig. 8.



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UNITED STATES PATENT OFFICE.

JACOB SCHINNELLER, OF PITTSBURG, PENNSYLVANIA.

AXLE-ROLLING MILL.

SPECIFICATION forming part of Letters Patent No. 672,516, dated April 23, 1901.

Application filed June 8, 1900. Serial No. 19,583. (No model.)

To all whom it may concern:

Be it known that I, JACOB SCHINNELLER, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Axle-Rolling Mills; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to apparatus for rolling car and other axles, and has for its object the production of an apparatus of this character in which the axle is suitably shaped at a single operation, which provides for the elongation of the metal due to the reduction of the blank, and which is provided with means for feeding the blank between the rolls and ejecting the finished axle therefrom.

To enable persons skilled in the art to construct and use my apparatus, I will now describe the same fully, referring to the accompanying drawings, in which—

Figure 1 is an end view of a mill embodying my invention. Fig. 2 is a front view of the same. Fig. 3 is a vertical transverse section thereof. Fig. 4 is a vertical longitudinal section on the line 4 4, Fig. 3. Fig. 5 is a top view of the lower roll, showing the means for holding the blank between the rolls. Figs. 6 and 7 are transverse sectional views of the rolls on the lines 6 6 and 7 7, respectively. Fig. 4 illustrates the manner of feeding in the blank and ejecting the finished axle, and Fig. 8 is a development in plan and elevation of the journal-forming collar of the rolls.

1 1 represent suitable bed-plates, to which are secured, as by means of bolts, the housings 2 2, in which are mounted the rolls 3 4. The rolls 3 4 are provided with suitable journals 16, mounted in boxes 5 6, moving in a vertical guideway in the housings, as is common in this class of apparatus. The distance between the rolls is regulated by screws 7, having one of their ends bearing against the lower side of the boxes 5 and taking into threaded apertures in frames 8, resting on the boxes 6. The upper roll 3 is held down against the blank by means of caps 9, resting on the journal-boxes 5 thereof, said cap being held in position by means of suitable bolts 10 10, as will be readily understood. By loosening the nuts on the bolts 10 10 and turning the screws 7 the distance between the rolls may be varied to roll the desired diameter of axle. The rolls are provided on each end with the gears 11 12, which mesh with gears 13, secured to the counter-shaft 14, mounted in the front of the roll-housings. By this means both rolls are driven in the same direction.

Each roll comprises the body 15, which is integral with the journals 16, said body having a flange or collar 17 at one end. The working faces of the rolls are made up of a series of sleeves or rings 18 18, 19 19, and 20, respectively, which sleeves or rings are slipped upon the body 15, one of the rings 18 resting against the collar 17 thereof, and are secured thereto in any suitable way. The body and journals of the rolls are made hollow, as shown in Fig. 4, and the sleeves or rings 18 and 20 are cored out on their under side, as shown, in order to reduce their weight. The rings 18, 19, and 20 may all be of the same width or they may vary in width in any manner desired or to facilitate the formation of the desired contour of working surface thereon. The lower roll 4 is provided with a longitudinal groove 22, extending from end to end thereof, said groove being formed by suitable grooves in each of the rings 18, 19, and 20 and of sufficient depth to permit the finished axle to drop therein for the purpose of ejecting the same from the rolls, as will hereinafter appear. The surfaces of the rings 18, 19, and 20 are suitably shaped to roll an axle of the desired contour, and should it be desired to roll axles of different contour or articles other than axles it is merely necessary to remove the rings 18, 19, and 20 and replace them by others having their surfaces shaped to roll the desired contour of article. In the specific form shown the sleeve 20 is highest at its middle and gradually tapers from the middle toward each end in order to roll an axle having the smallest diameter at its middle. The working face of the sleeve 20 is flush with the surface of the roll until it reaches the points 23, when the middle portion of said face gradually rises above the face of the roll to the point 24, from which point said face continues concentric with the axis of the roll and until it terminates in the abrupt shoulder 25. In the lower roll the groove 22 is located in the space between the

shoulder 25 and the point 23. The end portions of the working face of the sleeve 20 are concentric with the axis of the roll, and the rings or collars 19 have their working faces also concentric with the axis of the roll. The rings or collars 18 are each provided with an annular rib or projection 26 for forming the journals on the axle. These ribs or projections start substantially flush with the surface of the rolls and gradually increase in height to the point 27, from which point they remain of the same height until they terminate in the abrupt shoulder 28, the starting and ending points of these ribs or projections being in line with the starting and ending portions of the working face of the sleeve 20. The ribs or projections 26, furthermore, at their starting end are substantially a point and gradually increase in width up to the point 29, from which point they remain the same width to their ends, and said ribs gradually recede toward the end of the roll from the point of beginning of said ribs to the point 29. The object of this is to allow for the expansion of the blank due to the reduction of its diameter by the working face 20. From the point 29 to their ends the ribs or projections continue parallel with the end faces of the rolls.

In front of the machine, suitably secured to the bed 1, are standards 30, provided at their upper ends with downwardly-inclined surfaces 31, which terminate in close proximity to the lower roll 4. The surfaces 31 serve as a support for the blanks, from which the latter are fed into the rolls by means of fingers 32. These fingers are secured to rock-shafts 33, mounted in the collars 18 of the lower roll and project out through suitable slots 34 in the collars 19. The rock-shafts at their outer ends are provided with arms 35, which are adapted to engage cams 36, secured to the inner sides of the roll-housings. These cams 36 are placed in close proximity to the standards 30, so that when the roll in its revolution carries the fingers 32 to this position the cams 36 will engage the arms 35, rock the shafts 33, and throw the fingers into the position shown in Fig. 6, thereby enabling the same to lift a blank from the standards 30 and carry the same up between the rolls, at which point the arms 35 pass off the ends of the cams 36, enabling the fingers 32 to drop back into the slots 34 and pass beyond the blank.

To hold the blank in the bite of the rolls, I provide at the rear of the mill a shaft 37, on which are rigidly mounted arms 38, said arms being held in a horizontal position by means of set-screws 39, engaging the shaft 37. In the forward end of the arms 38 is secured a rod or shaft 40, upon which two rollers 41 41 are mounted. These rollers are opposite the collars 19 of the rolls and are adapted to engage with the cylindrical portions of the axle and hold the same in the bite of the rolls. In order to prevent the axle flying out at the front of the mill, the lower roll is preferably made slightly larger than the upper roll, and as both rolls are driven at the same speed the circumferential speed of the lower roll will be greater than that of the upper roll, thereby holding the blank against the rollers 41 41. On the rear side of the machine, suitably secured to the bed 1, are inclined guideways 42, upon which the axles are discharged when they leave the rolls.

The operation of the apparatus is as follows: The cylindrical blanks are placed on the inclined surfaces 31 of the standards 30, and the lower roll in its revolution carries the arms 35 into engagement with the cams 36, thereby projecting the fingers 32 radially, so that they lift the blank from the standards 30 and carry it upward into the bite of the rolls, where the blank is stopped by the rollers 41, the arms 35 having meanwhile passed off the cams 36, enabling the fingers 32 to drop back into the slots 34 and pass the blank. The blank is then rotated axially and compressed between the working faces of the rolls, the face 20 and the rib or projection 26 gradually reducing the diameter of the blank at the middle and journals thereof. The reduction of the middle of the blank by the working face 20 gradually and progressively forces the metal endwise, causing elongation of the blank, which elongation is compensated for by the receding edge of the rib 26, so that the inner edge of the journal-neck is started by the inner edge of the rib 26 and is finished on substantially the same line of metal by the finishing end of said rib. The journal of the axle is begun as a mere groove by the pointed end of the rib 26 and gradually increased in depth during one revolution of the axle-blank and then widened by said rib as it successively brings an increasing width into contact with the blank. In this manner the surplus metal of the axle is gradually forced toward the end of the blank and forms a collar, and the groove forming the journal gradually moves farther toward the end of the blank, due to the elongation of the latter by the reduction caused by the surface 20 of the rolls, said elongation being permitted by the receding inner edge of said rib. This process of reduction and elongation continues until the points 24 and 29 of the rolls are in contact with the blank, from which point the surfaces 20 of the rolls and the ribs 26 are concentric with the axes of the rolls, and the ribs 26 have both edges parallel to the ends of the rolls, so that the blank is rotated one or more times without any further reduction or elongation of the body or spreading of the journal, thereby giving a proper finish to the axle. As soon as the shoulders 25 28 of the rolls pass the blank the latter drops into the groove 22 of the lower roll and is carried underneath the rollers 41 to the rear of the machine, where it is discharged upon the inclined guideways 42. In the meantime the fingers 32 have been projected by the cams 36 and have carried an-

other blank into the bite of the rolls, and the process of reduction and elongation above described is repeated.

The receding and spreading features of the ribs or projections 26, which form the journals of the axle, are important in that they allow for the elongation of the blank, and thereby produce a much better finished journal than has heretofore been the case and at a less expenditure of power.

While I have shown the apparatus adapted to roll car-axles, it is obvious that the principle thereof may be applied to the rolling of any cylindrical article having a varying cross-section wherein during the process of rolling the blank is elongated and has a neck, necks, or collars formed thereupon by the rolls. In case it is desired to form a collar or collars on the article the ring or rings 18 would be replaced by a corresponding ring having, in place of the ribs 26, a groove gradually increasing in width and depth and gradually receding from the middle of the roll, as will be readily understood. It is also obvious that in place of having two coöperating rolls, as illustrated, the principle of my invention may be applied to a roll coöperating with a stationary concave.

What I claim, and desire to secure by Letters Patent, is—

1. A roll having a surface adapted to reduce the blank and having a portion at the side of the reducing-surface, said portion being in a different plane from the reducing-surface and gradually receding therefrom to allow for the elongation of the blank.

2. A roll having a surface adapted to reduce the blank, and having a raised portion at the side of the reducing-surface, said raised portion gradually receding from the reducing-surface to allow for the elongation of the blank.

3. A roll having a surface adapted to reduce the blank, and having a raised portion at the side of the reducing-surface, said raised portion gradually increasing in height and gradually receding from the reducing-surface to allow for the elongation of the blank.

4. A roll having a surface adapted to reduce the blank, and having a raised portion at the side of the reducing-surface, said raised portion gradually increasing in width and receding from the reducing-surface to allow for elongation of the blank.

5. A roll having a surface adapted to reduce the blank, and having a raised portion at the side of the reducing-surface, said raised portion gradually increasing in height and gradually increasing in width and receding from the reducing-surface to allow for elongation of the blank.

6. A roll having a surface adapted to reduce the blank, said surface gradually increasing in height from the surface of the roll, and having a raised portion at the side of the reducing-surface, said raised portion gradually receding from the reducing-surface to allow for elongation of the blank.

7. A roll having a surface adapted to reduce the blank, said surface gradually increasing in height from the surface of the roll, and having a raised portion at the side of the reducing-surface, said raised portion gradually increasing in height and gradually receding from the reducing-surface to allow for elongation of the blank.

8. A roll having a surface adapted to reduce the blank, said surface gradually increasing in height from the surface of the roll, and having a raised portion at the side of the reducing-surface, said raised portion gradually increasing in height and gradually increasing in width and receding from the reducing-surface to allow for elongation of the blank.

9. A roll having a surface adapted to reduce the blank, and having a portion at each side of the reducing-surface, said portions being in a different plane from the reducing-surface and gradually receding therefrom to allow for elongation of the blank.

10. A roll having a surface adapted to reduce the blank, said surface gradually increasing in height from the surface of the roll, and having a raised portion at each side of the reducing-surface, said raised portions gradually increasing in height and gradually receding from the reducing-surface to allow for elongation of the blank.

11. In rolling apparatus, the combination of rolls having surfaces arranged to coöperate to reduce the blank, each roll having a portion at the side of the reducing-surface, said portion being in a different plane from the reducing-surface and gradually receding therefrom to allow for elongation of the blank.

12. In rolling apparatus, the combination of rolls having surfaces arranged to coöperate to reduce the blank, said surfaces gradually increasing in height from the surfaces of the rolls, each roll having a raised portion at the side of the reducing-surface, said raised portion gradually increasing in height and gradually receding from the reducing-surface to allow for elongation of the blank.

13 A roll for axial or transverse rolling comprising a body portion, and a series of rings or collars on said body portion, said rings forming an unbroken working surface and having their faces shaped to produce the desired contour of working surface on the roll.

14. A roll for axial or transverse rolling, comprising a body portion and a series of rings removably secured to said body portion, said rings having their faces shaped to produce the desired working surface on the roll and being interchangeable with other rings having differently-shaped faces.

15. A roll for axial or transverse rolling, comprising a body portion, and a series of rings on said body portion, said rings being provided with alining grooves forming a groove for receiving and ejecting the article from the rolls

the faces of said rings being shaped to produce the desired contour of working surface on the rolls.

16. In rolling apparatus, the combination with rolls adapted to receive the blank axially, of movable means for feeding the blank to said rolls, means for holding the blank between said rolls, and means for ejecting the article from said rolls.

17. In rolling apparatus, the combination with rolls adapted to receive the blank axially, of movable means for feeding the blank to said rolls, means for holding the blank between said rolls, one of said rolls being provided with a groove to receive and eject the article from said rolls.

18. In rolling apparatus, the combination with rolls adapted to receive the blank axially, of means for feeding the blank to said rolls, an abutment for holding the blank between said rolls, one of said rolls being provided with a groove to receive and eject the article after rolling.

19. In rolling apparatus, the combination with rolls adapted to receive the blank axially, of a stationary cam, and a device pivoted to one of said rolls and arranged to engage said cam and to receive said blank and carry it into the rolls.

20. In rolling apparatus, the combination with rolls adapted to receive the blank axially, of a stationary cam, a device pivoted to one of said rolls and arranged to engage said cam and to receive the blank and carry it into the rolls, and means for holding the blank between the rolls.

21. In rolling apparatus, the combination with rolls adapted to receive the blank axially, of a stationary cam, a device pivoted to one of said rolls and arranged to engage said cam and to receive the blank and carry it into the rolls, means for holding the blank between the rolls and means for ejecting the article from the rolls.

22. In rolling apparatus, the combination with rolls adapted to receive the blank axially, of a stationary cam, and a device pivoted to one of said rolls and arranged to engage said cam and to receive a blank and carry it into the rolls, said roll being also provided with a groove adjacent the pivoted device to eject the article from the rolls.

23. In rolling apparatus, the combination with rolls adapted to receive the blank axially, of a stationary cam, a device pivoted to one of said rolls and arranged to engage said cam and to receive a blank and carry it into the rolls, said roll being also provided with a groove adjacent the pivoted device for ejecting the article from the rolls, and a stationary abutment for holding the blank between the rolls.

In testimony whereof I, the said JACOB SCHINNELLER, have hereunto set my hand.

JACOB SCHINNELLER.

Witnesses:

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ROBERT C. TOTTEN.